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Quality Assurance of a wind database for eastern Canada

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The reliability of any inferences resulting from the analysis of meteorological records lean on the quality of the observational data. The errors in the data can be roughly classified into three groups: random, systematic and rough errors. Random errors are unavoidable and inherent to the very nature of the measurements as instrumental responses to various physical phenomena. Systematic errors are produced by instrumental scale shifts and drifts or by some more or less persistent factor that is not taken into account. Rough errors are associated with sensor malfunction or errors arising during data processing, transmission, reception or storage. It is important to minimize observational datasets' errors, and thus essential to develop procedures that allow to identify those and correct the observations, thereby improving data quality.

This work involves the compilation and quality assurance of a data set of wind variables from a wide area over eastern Canada (including the provinces of Quebec, Prince Edward Island, New Brunswick, Nova Scotia, and Newfoundland and Labrador), a subset of the adjacent ocean areas and a set of the northeastern USA (Maine, New Hampshire, Massachusetts, New York and Vermont). The data set spans the period 1940-2009 and has been compiled from three different sources: a set of 414 land sites obtained from Environment Canada (1940-2009), a subset of 40 buoys distributed over the East Coast and the Canadian Great Lakes (1988-2008) provided by the Department of Fisheries and Oceans, and a subset of 259 land sites combining both eastern Canada and Northeast of the USA provided by the National Center of Atmospheric Research (1975-2007).

Once the initial data set was compiled, quality assurance techniques were applied to detect and correct for random measurement errors, outliers as well as systematic changes (inhomogeneities) in sampling procedures. The heterogeneous nature of the data made it necessary to take in account problems related with measurement-unit conversion problems as well as Local Standard Time (instead the official UTC) recording (as in the case of Environmental Canada subset).

This is the first step of a study at a regional scale that will be mainly focused in the area of Nova Scotia. The variability of the wind field will be analyzed attending to the specific features of the local topography and to changes in the large scale circulation. Subsequent studies will address the high spatial resolution simulation of the wind field using a regional climate model (WRF) and its validation with the presently developed data set.